

STATE OF KELANTAN.

The Annual Report

ON THE

MEDICAL DEPARTMENT

FOR THE YEAR

1928

BY

DR. L. W. EVANS,

ACTING CHIEF MEDICAL OFFICER.

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1929.

SECTION I

ADMINISTRATION.

I. ADMINISTRATION.

A. STAFF.

1. Dr. L. W. Evans acted as Chief Medical Officer throughout the year.
2. Health Officer, Dr. T. C. Lonie.
3. Matron, European Hospital, Miss C. Monk acted till 4.4.28 when she proceeded, on furlough. Miss M. Brebner relieved her being given the substantive appointment.
4. Dr. W. J. Geale acted as Medical Officer, Ulu Kelantan and Dr. Lim Shin Thwin assisted in Kota Bharu when required.
5. The total staff of the Department is given in Appendix I.

B. ORDINANCES AFFECTING PUBLIC HEALTH.

6. During the year the following were passed:—
 - (1) Municipal and Health Enactment 1928.
 - (2) An Enactment to amend "The Indian Immigration Enactment 1927."
 - (3) Notice No. 29 of 1928.—Rules under the Indian Immigration Enactment 1927.
 - (4) The Labour (Non Indian) Enactment No. 13 of 1928.

C. FINANCIAL.

7. The total revenue collected during the year was \$18,596.84 (compared with \$17,675.36 in 1927) namely:—

Hospital Fees and Sale of Medicines	...	...	\$18,381.15
Fees for Licences, etc.	...	...	\$ 215.69
		Total ...	<u>\$18,596.84</u>

8. The total expenditure was \$190,030.44 (compared with \$152,537.67 in 1927) namely:—

Personal Emoluments			
Including Health and Vet: Staff	...	...	\$ 65,848.53
Other Charges ...	...	...	\$124,181.91
		Total ...	<u>\$190,030.44</u>

9. These figures exclude the cost of all buildings and the upkeep thereof.
10. The total revenue of the State was \$2,570,550, so that the percentage of the revenue allotted to the Medical Department was 7.3 $\frac{3}{4}$ %.

(Details of Revenue and Expenditure are given in Appendix II).

SECTION II

PUBLIC HEALTH.

A. GENERAL REMARKS.

11. This year there has been a definite improvement of health in those areas where it has been possible to carry out public health measures.

12. In Kuala Krai for example very effective work was carried out by the Health Officer and District Officer Ulu Kelantan, and the improvement in the health of this town is recognised by all.

13. Bad health and sanitary conditions in Kuala Krai as a result of the January flood were referred to last year. That year it was reported that five Europeans resident there contracted malaria, but this year there has been no case among the six Europeans living in the Conservancy Board Area, while the number of patients admitted to Hospital from the Conservancy Board Area during the year showed a decrease of 10% (1298 admissions compared with 1410 in 1927).

14. The health of Estate labourers also shows a very marked improvement, the death rate being reduced from 60.1 per mille (1927) to 43.2 per mille. Among Indian labourers it is reduced from 78.3 per mille (1927) to 49.4 per mille.

15. As even approximately accurate birth and death statistics are still unavailable, it is not possible to give definite figures for the general health of the State, and difficult to form an opinion as to whether there has been any actual improvement or not.

16. The fact that the admissions to Government Hospitals this year have increased does not necessarily indicate a lowering of the general health as this is partly accounted for by the depression on rubber estates leading to the discharge of labourers, a large percentage of whom eventually seek admission to Hospital. (Thus 523 indigent Indian labourers admitted to Government Hospital as patients, were repatriated during the year).

17. Also the number of the rural population seeking Hospital treatment naturally increases *pari passu* with opening of roads, facilities of transport, etc.

18. The fact that the number of patients admitted to Hospital from the Kota Bharu Conservancy Board Area (where apart from Anti-Malarial oiling, little has as yet been possible in the way of public-health improvements) increased from 827 in 1927 to 1126 this year does not point to any definite improvement.

19. The table showing the sick, invaliding and death rates of European and non-European officials also gives higher figures this year, while the attendances at Pasir Puteh and Tumpat Dispensaries suggest no change in general health among the rural population.

B. INFECTIOUS AND COMMUNICABLE DISEASES.

20. There were no cases of cholera, plague or yellow fever.

21. **Smallpox.**—Two cases were reported in Kuala Krai in January and February, one in a small Chinese Hotel, the other in a native house. The patients were strictly isolated without removal, while contacts were given the option of isolated in the infected buildings or isolation Hospital.

743 people were vaccinated by house to house vaccination in or near the town.

22. **Chickenpox.**—Twelve cases were notified (nine from Kota Bharu, two from Pasir Puteh and one from Tumpat). There were no deaths.

Apart from five cases which occurred in Police Barracks and Gaol, who were removed to Isolation Camp, all were isolated without removal.

23. **Measles.**—Eight cases.

24. **Mumps.**—63 cases with no deaths. Mumps is undoubtedly of common occurrence, but never reported. The 63 cases referred to either occurred among the Police Force or in the Gaol, or were met with in out patient Departments.

25. **Malarias.**—These are still the most formidable diseases, though their incidence on rubber estates has been considerably reduced.

26. Hospital statistics are as follows:—

Malaria accounted for nearly 40% of admissions to the State Hospitals, 31% admissions to Estate Hospitals, 57% to F.M.S. Railway Hospitals.

27. Out of approximately 165 Europeans resident in Kelantan for more than six months 58, are reported to have been treated for Malaria during the year, while 37 of the 56 cases admitted to European Hospital were suffering from these diseases.

28. Quartan Malaria is rare.

29. Out of 1,000 films showing parasites examined in Kota Bharu Hospital, 460 showed *P. vivax*, 430 *P. falciparum*, 63 *P. malariae* while 47 had mixed benign and sub-tertian parasites.

30. In Government Hospitals all patients showing Gametocytes in blood films are treated with Palsmoquin Co Grain 1 daily till free and most Estate labourers admitted to Hospital with Malaria are given a course of this drug for five days before being discharged. No untoward symptoms have been noted in any case.

OTHER MOSQUITO BORNE DISEASES ARE RARE.

31. Seven cases of Elephantiasis in natives of Kelantan were admitted to State Hospital, Kota Bharu.

Dengue is still conspicuously absent.

HELMINTHIC DISEASES.

32. Ankylostomiasis is the only one of real importance from a health point of view, and accounted for 5.3% of admissions to Government Hospitals and 9% of admissions to Estate Hospitals.

33. In Estate Hospitals the number should undoubtedly be higher, as many Estate Dressers still record deaths from "Bright's disease," "Nephritis," and "Heart disease," the cause of these symptoms not being recognised or treated despite the repeated teaching of the Visiting Medical Officers concerned.

34. In 1,000 stool examinations made in State Hospital, Kota Bharu (Direct Method).

290 showed ova of *Tricocephalus dispar*.

277 of *Ascaris*.

150 of *Ankylostoma*

4 of *Taenia*.

DYSENTERY AND DIARRHOEA.

35. Account for 3% of cases in Government Hospitals, 13% in Estate Hospitals and 6.5% in F.M.S.R. Hospitals.

36. Of 87 definite cases of dysentery the stools of which were carefully examined on several occasions at State Hospital, Kota Bharu, 64 or 73.5% showed *Amoeba histolytica* or its cysts. This gives an approximate proportion of 26.5% of bacillary dysenteries.

PULMONARY TUBERCULOSIS IS COMMON.

37. 96 cases were treated in the State Hospital of whom 25 died, and several out patients were found to be suffering from active "Phthisis" with Tubercle bacilli in the Sputum.

38. The disease usually runs a rapid course, and unfortunately no advice or treatment that is likely to prove of any real value can be given to patients who are not in a position to leave Kelantan. (Where the humidity of the monsoon months so often proves fatal).

YAWS.

39. Neosalvarsan is still used in treatment, apart from infants who are now given Stovarsol (grain 4 daily).

This is found to be just as effective as Salvarsan, and is now equally well appreciated.

40. Of the 7,509 injections given for this disease,

4,494 were done in State Hospital, Kota Bharu

462 in District Hospital, Kuala Krai

1,292 in Pasir Puteh Dispensary

1,113 in Tumpat Dispensary.

147 by Travelling Dressers.

C. VITAL STATISTICS.

41. As birth and death notification is still poor, no rates for the general population can be deduced.

42. Notifications are still registered by Chief Medical Officer as in 1927.

In this way 3,557 births and 4,326 deaths were notified.

43. The mixed population of the larger towns still make no effort to notify births or deaths, and only 32 births and 42 deaths were notified from Kota Bharu town with a population which in 1921 was 10,833, and 6 births and 7 deaths from Kuala Krai town.

VITAL STATISTICS OF EUROPEANS.

44. The total number of Europeans resident in the State was approx: 165.

During the year there was one death (resulting from an accident). There were no deaths from disease.

There were two births and no infantile mortality.

TABLE SHOWING THE SICK, INVALIDING, AND DEATH RATES OF EUROPEAN OFFICIALS 1928.

45.	Total number of Officials resident	...	...	...	19.00
	Average number resident	...	...	...	19.00
	Total number on Sick List	...	...	...	.08
	Total number of days on Sick List	...	...	...	60.00
	Average daily number on Sick List	...	...	...	0.16
	Percentage of sick to average number resident	...	...	...	42.10
	Average number of days on Sick List for each patient	...	...	...	7.05
	Average sick time to each resident	...	...	...	3.15
	Total number invalided	...	...	...	nil.
	Percentage of invalidings to total resident	...	...	...	nil.
	Total deaths	...	...	...	1.00
	Percentage of deaths to total residents	...	...	...	5.26
	Percentage of deaths to total average number resident	...	...	...	5.26
	Number of cases of sickness contracted away from residence	...	...	...	?

TABLE SHOWING THE SICK, INVALIDING, AND DEATH RATES OF NON
EUROPEAN OFFICIALS 1928.

46.	Total number of officials resident	...	...	...	1296
	Average number resident	...	...	...	1296
	Total number on Sick List	...	...	...	1023
	Total number of days on Sick List	...	...	...	6402
	Average daily number on Sick List	...	...	...	17.5
	Percentage of sick to average number resident	...	...	...	73.9
	Average number of days on Sick List for each patient	...	...	...	6.2
	Average sick time to each resident	...	...	...	4.9
	Total number invalided	...	...	...	25.00
	Percentage of invalidings to total residents	...	...	...	1.9
	Total deaths	...	...	...	6.00
	Percentage of deaths to total residents	...	...	...	0.46
	Percentage of deaths to total average number resident	...	...	...	0.46
	Number of cases of sickness contracted away from residence	...	...	...	?

SECTION III

HYGIENE AND SANITATION.

47. **A.** A report by the Health Officer on Anti-Malarial Work, Conservancy and Labour conditions, as appended. (Appendix X.)

B. Other Preventive Measures.

48. **Vaccination.**—11472 Vaccinations against small-pox were done during the year. Of these 6473 were done in the various Hospitals and Dispensaries and 4999 by travelling vaccinators in villages.

49. **Pilgrims.**—The vaccination of prospective pilgrims to Mecca, inaugurated last year was continued.

50. 186 pilgrims were treated. Each was vaccinated against small-pox and given two inoculations, of Cholera vaccine (1,000 units and 2,000 units for adults and corresponding doses for children and infants).

A Certificate to this effect was given to each person.

51. **Cholera.**—Owing to occurrence of cholera in Siam, precautions against introduction of this disease into Kelantan were adopted from 28.2.28 to 6.7.28 and from 8.12.28 till the end of the year.

52. All passengers from that country arriving at Sungei Golok by train or at Tumpat by boat were inspected, and required to report to the nearest Dispensary for five days.

53. Kelantanese whose trade necessitated frequent visits to Siam were given passes valid for six months after receiving two injections of cholera vaccine.

54. **School Hygiene.**—This year, the more accessible vernacular schools were visited and treatment given for any ailments seen. This was combined with treatment of sick from neighbouring villages.

55. Vaccination, injection for yaws, etc., were done on the spot. For other diseases the appropriate medicines were forwarded later to the School Master for collection by the patients concerned.

FOOD IN RELATION TO DISEASES.

56. **Beri Beri.**—There has been a considerable reduction in the number of cases of this disease admitted to Government Hospitals and Estate Hospitals. (161 admitted to former compared with 346 in 1927 and 21 to Estate Hospitals compared with 299 in 1927).

SECTION IV

PORT HEALTH WORK AND ADMINISTRATION.

PORT HEALTH WORK AND ADMINISTRATION.

57. Mr. Sie Sing Chang, Deputy Health Officer remained at Tumpat throughout the year and boarded all vessels.

58. The total number of steamers calling at the Port was 140 with 3595 passengers, 141 of whom were Europeans. All were inspected but no case of infectious disease was seen.

59. During the periods referred to in para 51, all passengers arriving from Siam were required to report to the nearest convenient Dispensary for five days.

60. Only three cases were admitted to the Quarantine Camp at Tumpat (Dysentery, Measles and Mumps).

SECTION V

MATERNITY AND CHILD WELFARE WORK.

61. **Maternity and Child Welfare Work.**—There is no separate centre or organisation for Infant Welfare Work.

62. Only 4 Asiatic Maternity cases were admitted to Hospital, all owing to difficulty of labour.

63. No Malay women were admitted and those of other nationalities do not seek advice or help in normal cases. There are no Government recognised trained midwives practising in Kelantan, and even in towns most cases are dealt with by Malay women according to Malay customs.

64. The wives of several men of the Clerk class were visited in their houses by Hospital Assistants for advice in cases of pregnancy.

SECTION VI

HOSPITALS AND DISPENSARIES.

A. GENERAL.

The Government Hospitals and Dispensaries are as follows:—

65. In Kota Bharu a General Hospital, a small European Hospital, an Isolation Hospital, and a "Gaol Hospital" (which is now used exclusively as a Mental Hospital).

66. The wards in the "Old Hospital" are still used for surgical cases and "Second Class" patients as the Office Block, Dispensary and Operating Theatre of the New Hospital have not yet been built.

67. Two more wards in the New Hospital were completed in January and immediately occupied. Three more wards were erected during the year and occupied in July. We now have ample ward accommodation for our present needs. One of these new wards was designed for "Prisoners," and all sick from the Goal are now treated there.

68. In addition to the above, the Store room and three Dressers Quarters were erected on the New Hospital site.

69. In Kuala Krai there is a Hospital originally designed for 50 beds, but, with the temporary wards taken into use in 1926, it accommodates 80 patients. When overcrowded, patients are transferred to Kota Bharu.

70. Two Out Door Dispensaries.—One at Tumpat and one at Pasir Puteh, each with a Dresser (Special Grade and Grade I) in charge.

71. Two Isolation Hospitals—One at Kota Bharu and one at Tumpat.

72. There were 6,500 admissions to these Hospitals, and 75,275 attendances at the out-patient Dispensaries.

B. EUROPEAN HOSPITAL.

73. There were 56 admissions during the year (compared with 48 in 1927). There was no death.

74. Of the 56 admissions, 12 were Kelantan Government Servants 28 Planters, and 14 F.M.S.R. Personnel (Open Lines and Construction). These figures include wives and children of these three groups.

C. STATE HOSPITAL, KOTA BHARU.

75. Mr. T. J. Devota was in charge throughout the year.

76. In-patients.—174 remain on January 1st 3,985 new cases were admitted during the year and 278 transferred from Kuala Krai Hospital, giving a total of 4,437 treated (compared with 3,468 in 1927).

77. Of these 1,391 or 31.3% were Malays, while of the 541 female patients 50% were Malays (compared with 318 female patients of whom 51% were Malays in 1927).

78. There were 123 deaths giving a death rate of 2.77%. Excluding 31 deaths which occurred within 48 hours of admission the death rate was 2.29%.

79. 26 post mortem examinations were made.

80. The most prevalent diseases were:—

- Malarias. 1,664 cases with 38 deaths.
- Ankylostomiasis. 251 cases with 19 deaths.
- Venereal Diseases. 489 cases with no death.
- Chronic Ulcers. 245 cases with one death.
- Lung Diseases. 356 cases with 51 deaths.
- Beri Beri. 83 cases with 6 deaths.
- Dysenteries. 87 cases with 10 deaths.

81. **Operations.** 69 operations were performed under chloroform and 349 minor operations under local anaesthetic.

82. **Out-patients.** The number of attendances at the Dispensary was 45,298 (compared with 36,651 in 1927). Of these 81.3% were Malays.

D. DISTRICT HOSPITAL, KUALA KRAI.

83. Mr. Canagasaby was in resident charge under the supervision of Dr. Geale.

84. **In-patients.**—1914 were admitted during the year which with 63 remaining on January 1st gives a total of 1,977 treated (compared with 2,681 in 1927).

85. The total is, however, an increase of 540 over 1926, the last normal year. The high figure for 1927 was due to accommodation of patients from Estates and Railway Construction Camps, whose Hospitals were washed away by the flood.

86. Only 18% of the patients were Malays, the majority being Chinese (44%) and Indians (33%).

87. There were 87 deaths giving a death rate of 4.4% (against 7.61% in previous year). Excluding the 28 deaths which occurred within 48 hours of admissions, the death rate was 2.98%.

88. The most prevalent diseases were:—

Malarias. 988 cases with 34 deaths.

Dysenteries. 91 cases with 12 deaths.

Lung Diseases. 116 cases with 20 deaths.

Ulcers. 206 cases with no death.

Beri Beri. 76 cases with 6 deaths.

Ankylostomiasis. 92 cases with 5 deaths.

Venereal Diseases. 118 cases with no death.

89. Seventy minor operations were performed.

90. **Out-patients.**—The number of attendances at the Dispensary was 8,748 (compared with 11,236 in 1927).

E. TUMPAT DISPENSARY.

91. There were 8474 attendances (compared with 8,463 in 1927). 60% were Malays.

92. Thirty seven cases were admitted to the Emergency Ward. There were no deaths.

F. PASIR PUTEH DISPENSARY.

93. There were 13,221 attendances (compared with 14,515 in 1927) more than 80% of whom were Malays.

94. Detailed Statistics for Sickness are given in Appendices B III to VIII.

G. F.M.S. RAILWAYS HOSPITALS AND DISPENSARIES.

95. (a) **Open Lines** have no Hospital, their sick being sent to the State Hospitals.

96. They have a Dispensary at Pasir Mas with a Dresser in charge, who also attends to Kelantan Government Servants.

He treated 1,276 out-patients of whom only 57 were treated for Malaria.

97. (b) **Construction Department** have now re-erected their Hospitals which were lost in 1926 floods, and so no longer use our State Hospital for their labour force.

98. Their European personnel and "Second Class" patients are still sent to State Hospitals at Kota Bharu, from the "Kelantan North" Division.

99. "Kelantan North" Division have two Hospitals, one at Kuala Gris and one at Manik Urai, and Dispensaries at Kuala Krai and Kemubu.

100. "Kelantan South" Division have a Hospital at Gua Musang, and Dispensaries at Lipis and Bertam.

101. Figures for patients treated in these Hospitals and Dispensaries are given in Appendix XV.

H. ESTATE HOSPITALS.

102. These are dealt with in Health Officer's report. Statistics are given in Appendices XI to XV.

SECTION VII

PRISONS AND ASYLUMS.

A. HEALTH OF PRISONERS.**103. Kota Bharu.**

The total number of prisoners under detention in the Prison at Kota Bharu was 346.

104. 267 were admitted to Hospital and 4 died. .

105. An epidemic of Mumps accounted for 20 cases. Most of the remaining patients were admitted for minor complaints.

106. The deaths were due to:—

Pulmonary Tuberculosis 2, Broncho Pneumonia 1 and Ankylostomiasis 1.

107. Kuala Krai.

Out of 202 prisoners detained in Kuala Krai Prison, 162 were admitted to Hospital and one died in the Prison. (Heart failure following epilepsy).

B. MENTAL DISEASES ASYLUM.

108. In July sick prisoners were removed to a ward in the New Hospital. This made the "Gaol Hospital" available for housing mental cases only, thus easing the congestion that had prevailed hitherto.

109. Even now this Hospital is occasionally overcrowded, and in December the F.M.S. were asked if they would accommodate more of our male patients (above the maximum of 10 arranged for in 1925). They were unable to do so, owing to lack of room in their Central Mental Hospital.

110. The following are the Statistics:—

(a) "Gaol Hospital" (now Mental Hospital).

24 remained on January 1st.

53 were admitted during the year giving a total of 77 cases dealt with. Of these 8 were transferred to Central Mental Hospital, Tanjong Rambutan, one to Johore, 34 were discharged, 3 died and 1 absconded.

30 remained on December 31st.

(b) Maintained at Central Mental Hospital, Tanjong Rambutan.

8 remained on January 1st.

8 were transferred to the Hospital during the year.

Of these 2 were discharged, 2 died, leaving 12 (9 male and 3 female) on December 31st.

(c) Maintained at Central Mental Hospital, Singapore.

1 case remained on January 1st (transferred in 1910).

1 Private Patient was transferred there in October and was discharged in November (a Singapore Malay).

C. LEPER ASYLUM.

111. In December the accommodation for Lepers was increased by the addition of a second ward of a temporary nature.

112. These wards are isolated, but there is no guard. The patients seeking admission to them are almost entirely indigent Chinese of the coolie class.

113. The Statistics are as follows:—

12 Remained on January 1st.

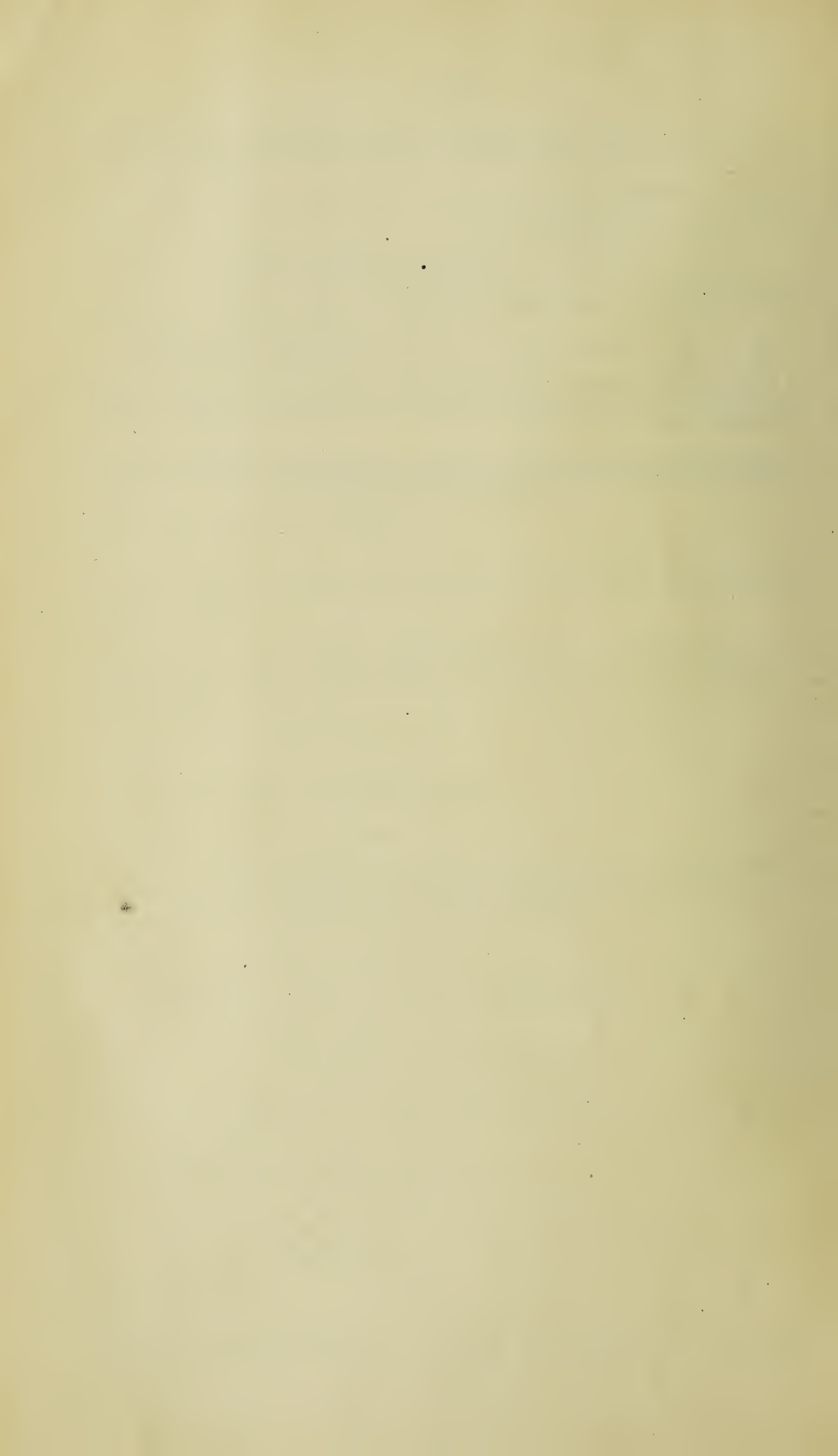
18 were admitted during the year, making a total of 30 treated.

Of these 1 died, 9 absconded and 20 remained on December 31st.

114. Of the 30 patients treated, 28 were Chinese, the remaining 2 being Indians.

115. The Routine treatment consists of Tai Foong Chee by mouth, and weekly injections of "E.C.C.O." Early skin lesions are painted with Trichlor-Acetic Acid, and other complications treated symptomatically.

116. Only one case developed a marked leprous reaction following "E.C.C.O." injections. He was treated with Ephredine, and the reaction quickly subsided.



SECTION VIII
METEOROLOGY.

METEOROLOGY.

117. Details of rainfall and temperature for the various stations are given in Appendices XVII and XVIII.

118. Observation made at State Hospital, Kota Bharu give the following figures:—

(a) **Temperature.**

Highest Shade Maximum was 99.°F on 20.10.28.

Lowest Shade Minimum was 69.°F on 14.8.28.

Highest Sun Temperature was 160.0°F on 3 occasions 5th and 17th of August and 27th September.

Average Mean Temperature 82.84F°.

(b) **Rainfall.**

Total of 147.94 inches compared with 101.90 inches in 1927.

DECEMBER FLOODS.

119. The rainfall recorded at Kota Bharu during the month of December was 27.64 inches, but, in most stations further South the records were higher, the highest being 62.45 inches recorded at Sungei Bagan and 53.89 inches at Ulu Kesial.

120. The river rose beyond the railway ferry landing stage at Kota Bharu on 23rd, December and from December 26th,—31st, several streets were inundated while the Hospital compounds were 3-4 feet under water, which entered the Dispensary, Operating Theatre and the lower wards.

121 The level of the water in the town was only 8 inches below the record flood of 1926.

122. In Kuala Krai the lower part of the town only was flooded, but preparations for refugees were made on the Hospital Hill where 600 bags of rice were stored (in the Hospital buildings and Cosmopolitan Club).

SECTION IX
VETERINARY.

Veterinary.

123. In March Mr. Mehta was appointed Veterinary Inspector. Previously there had been no such appointment.

124. His report is attached (Appendix XVI).

125. With regard to the cases of Anthrax recorded by him, there is no reason to believe that this is a new out-break, but that, as the State had no Veterinary personnel previously, such cases were not recognised or reported.

126. Thus several references to Anthrax occur in the State Annual Reports, and it is probable that there is now a certain amount of immunity to this disease both among human beings and cattle, which prevents the disease extending to epidemic proportions in the latter, or cases occurring among the men who attend the sick cattle.

In 1909 for example it is stated that an epidemic or communicable Anthrax among human was "at first virulent and caused many deaths, but later on assumed a milder form, amounting to no more than a slight feverish attack."

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

APPENDIX I.

TOTAL STAFFS OF THE MEDICAL DEPARTMENT DURING 1928.

State Hospital:—

No. 1	Acting Chief Medical Officer
2	Health Officer
3	Senior Hospital Assistant
4	Hospital Assistant (Gaol Hospital)
5	Dresser Grade I
6	do I
7	do II
8	do II
9	do III
10	do III
11	do III
12	do III
13	Probationer Dresser
14	do
15	do
16	do
17	do
18	Dispenser Grade III
19	do III
20	Veterinary Inspector
21	Chief Clerk Grade I
22	Second Clerk Grade III
23	Probationer Clerk
24	Malay Clerk Grade III
25	Asst. Store Keeper
26	Travelling Dispenser
27	Vaccinator
28	do
29	Peon
30	do
31	do
32	Chief Attendant
33	Dispensary Attendant
34	Ward Attendant
35	do
36	do
37	do
38	do
39	do
40	do
41	do
42	do
43	do
44	do
45	do (Second Class Ward)
46	do (do)
47	do (female)
48	do (do)
49	do (do Second Class Ward)
50	Night Attendant
51	Head Cook
52	do
53	do

APPENDIX I.—(Continued.)

54	do (Second Class Ward)
55	Asst. Cook
56	do
57	do
58	Gardener
59	do
60	do
61	do
62	Bullock Cart Driver
63	Toty
64	do
65	do
66	do
67	Tukang Ayer
68	do
69	do
70	do
71	do
72	Watchman
73	do
74	do (I. Camp)
75	Cook and Attendant (I. Camp)
76	Toty (I. Camp)

European Hospital:—

No. 1	Matron (assists in supervision of State Hospital)
2	Sister
3	Nurse
4	Attendant
5	do
6	Cook (European Hospital)
7	do (Sisters Quarters)
8	Servant to Matron
9	Servant to Sister
10	Tukang Ayer
11	do
12	Gardener
13	Toty
14	Watchman

Kuala Krai Hospital:—

No. 1	Medical Officer
2	Hospital Assistant
3	Dresser Grade III
4	do III
5	Probationer Dresser
6	Attendant
7	do
8	do
9	do
10	do
11	do
12	do (female)
14	Cook
15	do
16	Toty
17	do

APPENDIX I.—(Continued.)

18	Gardener
19	do
20	do
21	do
22	Watchman

Tumpat Dispensary:—

No. 1	Deputy Health Officer
2	Attendant
3	Watchman

Pasir Puteh Dispensary:—

No. 1	Dresser in Charge
2	Attendant

Anti-Malarial Work, Kota Bharu:—

No. 1	Anti-Malarial Inspector
2	Mandor
3	Coolie
4	do
5	do
6	do
7	do
8	do
9	do
10	do

Anti-Malarial Work, Kuala Krai:—

No. 1	Anti-Malarial Inspector
2	Mandor
3	Coolie
4	do
5	do
6	do
7	do

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

APPENDIX II.

Expenditure 1928.

				\$ cts.
A Personal Emoluments	...	...	...	61,170.43
Allowance Travelling and Personal	...	...	...	3,149.62
„ Motor Car	...	...	...	2,277.00
„ Motor Cycle	...	...	...	1,304.53
„ Bicycle	...	...	...	719.99
„ Sister (Washing)	...	...	...	478.01
Contingent Expenses	...	...	...	5,399.35
Diets and Extras	...	...	...	36,099.81
Equipment	...	...	...	10,197.92
Infectious Disease	...	...	...	2,113.27
Anti-Malarial Work	...	...	...	2,978.34
Medicines and Instruments	...	...	...	32,915.45
Maintenance of Lunatics	...	...	...	2,708.09
Uniform	...	...	...	605.10
Wages Hospital Servants	...	...	...	18,655.98
Allowance Sisters (Transport)	...	...	...	697.52
Allowance to Dr. Geale and Dr. Lim	...	...	...	3,600.00
Purchase of Typewriter	200.00
Purchase of Bicycle	81.93
Temporary Allowance	4,678.10
				<hr/>
				\$190,030.44
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Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

REVENUE RETURN 1928.

Kota Bharu.

Hospital Fees	...	...	...	...	\$10,999.44	
Sale of Medicines	...	...	...	...	1,996.46	
Licence Fees	...	...	...	...	20.50	
Miscellaneous Receipts	...	...	...	...	195.19	\$13,211.59

Tumpat.

Hospital Fees	...	...	...	...	5.50	
Sale of Medicines	...	...	...	...	907.60	
Out-door Dispensary Receipts	...	...	...	...	98.65	1,011.75

Kuala Krai.

Hospital Fees	...	...	...	...	3,718.70	
Sale of Medicines	...	...	...	...	421.25	4,139.95

Pasir Puteh.

Sale of Medicines	...	...	...	...	188.75	
Out-door Dispensary Receipts	...	...	...	...	44.80	233.53

\$18,596.84

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

Appendix III.

Government of Kelantan.

RETURN of SICK (In-door) of the Government Hospitals in Kelantan for the year ending
31st December, 1929.

Class.	Specific Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Absconded.	Died.	Remaining.	Remarks.
Infective Diseases.	Cerebrospinal fever	...	...	...	...	...	...	...	...	...
	Chicken-pox	...	8	8	8	...	...	...	...	...
	Cholera	...	...	...	...	...	...	...	...	...
	Dengue	...	...	...	...	...	...	...	...	...
	Diphtheria	...	...	...	...	...	...	...	...	...
	Dysentery A.	...	7	94	101	86	...	12	3	...
	„ B	...	1	57	58	48	...	9	1	...
	Erysipelas	...	...	1	1	1	...	...	...	...
	Gonorrhœa	...	7	119	126	118	...	...	8	...
	Gonorrhœal rheumatism	...	5	67	72	66	...	...	6	...
	Gonorrhœal conjunctivitis	...	...	9	9	8	...	...	1	...
	Hydrophobia	...	...	...	...	...	...	...	...	...
	Coryza	...	1	15	16	16	...	...	...	...
	Leprosy	...	12	21	33	...	12	1	20	...
	Madura disease	...	...	...	...	...	...	...	...	...
	Malaria—	...	...	...	...	...	...	...	...	...
	(a) Benign tertian	...	32	779	811	794	...	3	14	...
	(b) Quartan	...	...	63	63	61	...	1	1	...
	(c) Malignant tertian	...	11	533	544	478	...	39	27	...
	(d) Mixed infection	...	2	45	47	45	...	2	...	...
	(e) Type undiagnosed	...	8	438	446	432	...	2	12	...
	(f) Malarial cachexia	...	26	801	827	778	...	25	24	...
	(g) Blackwater fever	...	...	...	...	...	...	...	...	...
	Measles	...	...	...	...	...	...	...	...	...
	Mumps	...	1	62	63	54	...	...	9	...
	Phagedœna	...	...	...	...	...	...	...	...	...
	Plague	...	...	...	...	...	...	...	...	...
	Pneumonia	...	2	98	100	62	...	34	4	...
	Pyæmia	...	...	1	1	1	...	...	...	...
	Pyrexia of uncertain origin	...	...	...	...	...	...	...	...	...
	Rheumatism	...	...	18	18	18	...	...	...	...
	Septicæmia	...	...	3	3	1	...	...	...	...
	Small-pox	...	...	...	...	...	...	...	...	...
	Syphilis—	...	...	...	...	...	...	...	...	...
	(a) Primary	...	9	109	118	107	...	...	11	...
	(b) Secondary	...	2	29	31	29	...	...	2	...
	(c) Tertiary	...	5	64	69	64	...	...	5	...
	Tetanus	...	...	...	...	...	...	...	...	...
	Tuberculosis—	...	...	...	...	...	...	...	...	...
	(a) General	...	...	6	6	5	...	1	...	...
	(b) Phthisis	...	4	115	119	110	...	8	1	...
	Whooping Cough	...	...	...	...	...	...	...	...	...
	Yaws	...	26	488	514	487	...	2	25	...
	Other Infective Disease	...	...	...	...	...	...	...	...	...
Intoxications.	Alcoholism	...	...	...	...	...	...	...	...	...
	Mercury, chronic poisoning by	...	...	...	...	...	...	...	...	...
	Morphinism	...	...	...	...	...	...	...	...	...
	Other Intoxications	...	...	...	...	...	...	...	...	...
Carried forward		161	4043	4204	3877	...	12	141	174	...

Class.	Specific Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Absconded.	Died.	Remaining.	Remarks.
General Diseases not included in the two preceding Groups.	<i>Brought forward</i> ...	161	4043	4204	3877		12	141	174	
	Gen: Debility ...	1	43	44	37			5	2	
	Beri-beri ...	14	147	161	133			12	16	
	Diabetes ...									
	Gout ...									
	Scurvy ...		1	1	1					
	Lymphadenoma ...									
	Osteo-arthritis ...									
	Other General Diseases ...									
Certain Morbid Conditions incident to Various Parts	Malformations ...									
	New Growth, Non-malignant ...		2	2	2					
	Do. Malignant ...		3	3	3					
	Cyst ...									
	Other Morbid Conditions ...									
Nerves.	Neuritis ...	1	7	8	8					
	Multiple Neuritis ...									
	Other Diseases of the Nerves ...									
Spinal Cord and Membranes.	Meningitis ...									
	Myelitis ...									
	Primary lateral sclerosis ...									
	Locomotor ataxia ...									
	Insular sclerosis ...									
	Other Diseases of Spinal Cord and Membranes ...									
Brain and Membranes.	Meningitis ...									
	Hæmorrhage ...									
	Concussion of Brain ...		2	2	2					
	Hydrocephalus ...									
	Other Diseases Tumour of Brain and Membranes ...		1	1	1					
Nervous Disorders.	Apoplexy ...									
	Paraplegia ...	1	1	2	2					
	Hemiplegia ...	1	8	9	5				4	
	Monoplegia ...		1	1					1	
	Chorea ...		2	2	1				1	
	Convulsions ...		6	6	6					
	Epilepsy ...									
	Neuralgia ...		1	1						
	Hysteria ...		1	1	1				1	
	Facial Paralysis ...		3	3	3					
	Paralysis of unknown origin ...									
	Other Nervous Disorders ...		2	2	1				1	
Mental Diseases.	Idiocy ...									
	Mania ...									
	Melancholia ...		5	5	5					
	Delusional insanity ...									
	General paralysis of the insane ...									
	Dementia ...									
	Other Mental Diseases ...									
	<i>Carried forward</i> ...	179	4279	4458	4088		12	158	200	

Class.	Specific Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Absconded.	Died.	Remaining.	Remarks.
	<i>Brought forward</i> ...	179	4279	4458	4088		12	158	200	
Diseases of the Eye.	Conjunctivitis ...		30	30	30					
	Trachoma ...		4	4	4					
	Keratitis ...									
	Ulcer of cornea ...	2	7	9	7				2	
	Opacity of cornea ...		3	3	3					
	Staphyloma ...									
	Iritis ...		2	2	2					
	Glaucoma ...									
	Hypopyon ...									
	Optic neuritis ...		1	1	1					
	Optic atrophy ...									
	Cataract ...	1	3	4	4					
	Panophthalmitis ...									
	Amblyopia and Amaurosis ...									
	Errors in Refraction ...									
Diseases of the Ear.	Blepharitis ...									
	Entropion ...									
Diseases of the Nose.	Other Eye Diseases ...		1	1	1					
	Inflammation Atitis ...		2	2	2					
Diseases of the Circulatory System.	Other Ear Diseases Atorrhoea ...		6	6	6					
	Inflammation ...									
	Other Nose Diseases ...		1	1					1	
	Pericarditis ...									
	Endocarditis ...									
	Valvular Disease of Heart ...		1	1	1					
	Myocarditis ...									
	Dilatation of Heart ...									
	Syncope ...									
	Disordered action of Heart ...									
	Aneurysm ...									
	Phlebitis ...									
	Thrombosis ...									
	Varix ...									
	Other Diseases of the System ...									
Diseases of the Respiratory System.	Asthma ...	2	39	41	36				5	
	Laryngitis ...									
	Bronchitis ...	3	209	212	199			3	10	
	Broncho-pneumonia ...	4	22	26	22			4		
	Gangrene of lung ...									
	Pleurisy ...		8	8	8					
	Empyema ...		1	1				1		
	Other Diseases of the System ...									
	Stomatitis ...		4	4	3				1	
	Ulceration of mouth ...		6	6	6					
	Gangrene of mouth ...									
	Pyorrhœa alveolaris ...		4	4	3				1	
	Caries of tooth ...		8	8	8					
	Ulceration of tongue ...									
	Sore throat ...									
Diseases of the Digestive System.	Tonsillitis ...		3	3	3					
	Inflammation of pharynx ...		4	4	4					
	Gastritis ...		4	4	3			1		
	Ulceration of stomach ...									
	Dyspepsia ...		9	9	9					
	Enteritis-gastro ...		3	3	3					
	Appendicitis ...									
	Hiccough ...		2	2	2					
	Ulceration of intestines ...									
	Sprue ...									
	Hernia ...		5	5	5					
	Intestinal obstruction ...									
	Diarrhœa ...		44	44	42			1	1	
	<i>Carried forward</i> ...	191	4715	4906	4505		12	168	221	

Class.	Specific Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Absconded.	Died.	Remaining.	Remarks.
Diseases of the Digestive System—(cont.) Diseases of the Lymphatic System. Diseases of the Urinary System. Diseases of the Generative System. Affections connected with Pregnancy and Parturition.	Brought forward ...	191	4715	4906	4505		12	168	221	
	Constipation ...		24	24	23				1	
	Colic ...		2	2	2					
	Ischio-rectal Abscess ...									
	Ulcer of anus ...									
	Fissure of anus ...									
	Fistula in ano ...									
	Hemorrhoids ...		5	6	5					
	Hepatitis ...		13	13	12			1		
	Abscess of liver ...									
	Cirrhosis of liver ...									
	Congestion of liver ...									
	Jaundice ...		9	9	9					
	Gall stones ...									
	Peritonitis ...									
	Ascites of unknown origin ...	1	5	6	3			2	1	
	Other Diseases of the System ...		1	1	1					
	Spleen, Inflammation ...									
	Spleen, Rupture ...									
	Bubo ...		16	16	12					4
	Suppuration of Glands ...									
	Lymphangitis ...		5	5	4					1
	Other Diseases of the System ...									
	DISEASES OF THE THYMUS ...									
	DISEASES OF THE THYROID BODY ...									
	DISEASES OF THE ADRENALS (Supra-renals)									
	Acute Nephritis ...									
	Bright's disease ...	1	6	7	3				4	
	Cystitis ...	1	10	11	11					
	Calculus ...									
	Retention of urine ...									
	Renal colic ...		1	1	1					
	Other Diseases of the System ...									
	Stricture ...		1	1	1					
	Urethral fistula ...		1	1	1					
	Extravasation of urine ...									
	Phimosis ...									
	Ulcer Penis ...									
	Soft chancre ...		3	3	3					
	Scrotum, Abscess ...									
	Do. Sloughing ...	1	2	3	3					
	Hydrocele ...									
	Orchitis ...		13	13	12					1
	Epididymitis ...		27	27	27					
	Other Diseases Rupture of Urethra Male									
Organs ...		1	1					1		
Metritis ...										
Erosion of cervix ...										
Displacements and distortions ...										
Vulva, Inflammation ...										
Do. Abscess ...										
Do. Ulcer ...										
Do. Soft Chancre ...										
Other Diseases Female Organs Salpingitis			3	3	3					
Natural Labour ...			2	2	2					
Difficult Labour ...			1	1	1					
Abortion ...										
Rupture perineum ...										
Retention of placenta ...		1	1	1						
Still-birth ...										
Premature birth ...										
Post-partum hæmorrhage ...										
Puerperal sapræmia ...		1	1	1						
Other Affections ...										
	Carried forward ...	195	4868	5063	4646		12	176	229	Died of Pneu- monia.

Class.	Specific Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Absconded.	Died.	Remaining.	Remarks.
	<i>Brought forward</i> ...	195	4868	5063	4646		12	176	229	
Diseases of the Organs of Locomotion.	DISEASES OF THE FEMALE BREAST ...									
	DISEASES OF THE MALE BREAST ...									
Diseases of the Connective Tissue.	Periostitis ...		6	6	6					
	Caries of bones ...									
Diseases of the Skin.	Necrosis of bones ...									
	Arthritis ...	2	40	42	35				7	
Diseases of the Skin.	Synovitis ...	3	3	6	6					
	Ankylosis ...		1	1	1					
Diseases of the Skin.	Caries of spine ...									
	Curvature spine ...		1	1					1	
Diseases of the Skin.	Myalgia ...		1	1	1					
	Other Diseases of Organs of Locomotion ...									
Diseases of the Skin.	Cellulitis ...		5	5	5					
	Abscess ...	2	36	38	35				3	
Diseases of the Skin.	Gangrene ...									
	Edema ...									
Diseases of the Skin.	Other Diseases of the Connective Tissue ...									
	Urticaria ...									
Diseases of the Skin.	Eczema ...	1	40	41	41					
	Boil ...		9	9	9					
Diseases of the Skin.	Carbuncle ...		3	3	3					
	Herpes ...									
Diseases of the Skin.	Herpes zoster ...		5	5	5					
	Psoriasis ...		2	2	2					
Diseases of the Skin.	Ulcer ...	11	442	453	428					
	Other Skin Diseases ...							1	24	Died from exhaustion.
Injuries.	General ...									
	Local—Hæmotoma ...		1	1	1					
Injuries.	(a) Wounds ...	7	217	224	215				9	
	(b) Sprains ...		39	39	39					
Injuries.	(c) Fractures, simple ...		4	4	4					
	(d) Do. compound ...		2	2	1				1	
Injuries.	(e) Burn ...	1	8	9	9					
	(f) Other local injuries Bruises and Contusions ...		38	38	34			1	3	
Poisons.	Mercury ...									
	Alcohol ...									
Poisons.	Belladonna ...									
	Opium ...		2	2	2					
Poisons.	Datura ...									
	Other Poisons ...									
Parasites.	Balantidium Coli ...									
	Other Protozoa ...									
Parasites.	Schistosomum Hæmatobium ...									
	Do. Japonicum ...									
Parasites.	Other Trematoda ...									
	Tænia Solium ...									
Parasites.	Do. saginata ...									
	Do. echinococcus ...									
Parasites.	Other Cestoda ...									
	Ascaris Lumbricoides ...		58	58	57				1	
Parasites.	Ancylostomiasis ...	6	353	359	318			25	16	
	Oxyuris Vermicularis ...									
Parasites.	Filaria Medinensis ...		3	3	3					
	Other Nematoda ...									
Parasites.	Tinea Tonsurans ...		9	9	9					
	Do. Circinata ...		27	27	26				1	
Parasites.	Do. Cruris ...									
	<i>Carried forward</i> ...	228	5223	6451	5941		12	203	295	

Class.	Specific Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Absconded.	Died.	Remaining.	Remarks.
Parasites—(cont.)	<i>Brought forward</i> ...	228	6223	6451	5941		12	203	295	
	Tinea Imbricata ...		6	6	5				1	
	Other Vegetable Parasites ...									
	Scabies ...	2	73	75	73				2	
	Pediculosis ...									
	Other Animal Parasites ...									
	Major—	2	59	61	47			10	4	
	Minor—	8	114	122	114				8	
	UNDER OBSERVATION ...	1	25	26	25				1	
	NO DISCOVERABLE DISEASES ...									
Surgical Operations.	TOTAL ...	241	6500	6741	6205		12	213	311	
	NATIONALITIES OF PATIENTS.									
	Europeans ...		56	56	56					
	Eurasians ...		3	3	3					
	Chinese ...	95	1560	1655	1435		12	82	126	
	Indians ...	69	2881	2950	2755			110	85	
	Javanese ...	4	83	87	79			3	5	
	Malays ...	73	1876	1949	1837			17	95	
	Japanese ...		4	4	4					
	Others ...		37	37	36			1		
	TOTAL ...	241	6500	6741	6205		12	213	311	

	Europeans.	Eurasians.	Malays	Chinese.	Indians.	Others.		Grand Total.
New Cases.								
Repetitions.								
Total.								
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KELANTAN.

APPENDIX V.

MOST PREVALENT DISEASES IN GOVERNMENT HOSPITALS, 1928.

Diseases.	Kota Bharu Hospital.			Kuala Krai Hospital.		
	Cases.	Deaths.	Death rate	Cases.	Deaths.	Death rate.
Malaria						
Benign tertian	... 456	3		355	—	
Quartan	... 63	1		—	—	
Malignant tertian	... 424	22		120	17	
Mixed infection	... 47	2	2.45%	—	—	3.44%
Type undiagnosed	... 175	2		271	—	
Mal: Cachexia	... 385	8		242	17	
Dysentery and Diarrhoea						
Amoebic	... 70	7		31	5	
Bacillary	... 23	3	9.00%	35	6	13.18%
Diarrhoea	... 18	—		25	1	
Ankylostomiasis	... 267	20	7.49%	29	5	5.43%
Venereal Disease						
Syphilis	... 236	—		51	—	
Gonorrhoea and its sequelae	260	—	—	67	—	—
Soft chancre	... 3	—		—	—	
Ulcers	... 245	1	0.40%	206	—	—
Pneumonia	... 81	23	28.39%	45	15	33.33%
Phthisis	... 99	26	26.26%	20	5	25.00%
Beri Beri	... 85	6	7.05%	76	6	7.89%

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

Appendix VI.

STATE HOSPITALS.

STATISTICS SHOWING THE NUMBER OF ADMISSIONS AND DEATH RATES OF THE PRINCIPAL DISEASES DURING

THE LAST FIVE YEARS 1924 TO 1928.

	Total admission.					Deaths.					Percentage.				
	1924	1925	1926	1927	1928	1924	1925	1926	1927	1928	1924	1925	1926	1927	1928
Malaria	277	623	1073	2251	2659	5	11	34	89	72	1.80	1.76	3.16	3.95	2.70
Ankylostomiasis	123	233	183	184	353	2	6	11	8	25	1.62	2.57	6.11	4.34	7.08
Pneumonia Lobar	34	68	89	119	98	8	18	20	34	34	23.52	26.47	25 0	28.56	34.69
Broncho Pneumonia	13	37	76	30	22	3	3	1	4	4	23 07	2.10	6.25	13.33	18 18
Bronchitis	58	281	196	184	209	.	...	1	1	3	...	...	0.51	0.54	1.43
Dysentery	64	101	66	290	151	1	5	5	45	21	1.56	4.95	5.81	15.51	13.90
Syphilis	173	141	204	227	275	...	...	1	2	...	..	...	0.49	0.88	...
Yaws	346	569	613	390	484	...	...	1	...	2	...	...	0 16	...	0.41
Ulcers	181	376	408	442	412	...	...	2	2	1	..	...	0.46	0.15	0.22
Beri Beri	...	...	..	...	147	...	...	...	...	12	...	...	...	...	8.16

Sd/- L. W. EVANS,
Ag. Chief Medical Officer,
 KELANTAN.

APPENDIX VII.

ASSAULT CASES TREATED IN GOVERNMENT HOSPITALS
DURING THE YEAR 1928.

Name of Hospitals.	Malays.	Chinese	Indians.	Others.	Total.
Kota Bharu	233	56	45	8	342
Kuala Krai	17	22	24	2	65
Pasir Puteh	50	—	—	4	54
Tumpat	103	14	25	4	146
	403	92	94	18	607

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

APPENDIX VIII.

MICROSCOPICAL EXAMINATION IN STATE HOSPITAL, KOTA BHARU.

Faeces.

Ova Trico caphalus disp.	...	...	...	290
,, Ascaris	...	...	...	277
,, Ankylostoma	...	...	...	256
,, Strongeloids	...	...	...	9
,, Taenia Saginata	...	...	...	4
,, Oxuris Vermicularis	...	...	...	2
Amoeba histolytica	...	...	...	94
Negative	...	...	...	258

Total 1,190

Blood.

Benign tertian	...	...	...	461
Quartan	...	...	...	84
Sub-tertian	...	...	...	497
Mixed infection	...	...	...	69
Negative	...	...	...	1,795

Total 2,906

Sputum.

T. B.	...	...	...	48
Leprösy	...	...	...	6

Total 54

KUALA KRAI HOSPITAL.

Faeces.

Ova Ascaris	...	...	...	75
,, Ankylostoma	...	...	...	114
Amoeba histolytica	...	...	...	42
Negative	...	...	...	56

Total 287

Blood.

Benign tertian	537
Sub-tertian	256
Negative	327

Total 1,120

Sputum.

T. B.	22
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Sd/- L. W. EVANS,
 Ag. Chief Medical Officer,
 KELANTAN.

APPENDIX IX.

VACCINATION RETURN FOR THE YEAR 1928.

Stations.	Number vaccinated.								Result.				Percentage.		
	Europeans.	Eurasians.	Chinese.	Indians.	Malay's.	Javanese.	Others.	Total.	Perfect.	Modified.	Failed.	Not seen.	Total vaccinat- ed.	Perfect.	Failed.
Upper Kelantan	7	—	203	158	9,812	—	74	10,254	10,002	—	252	—	10,254		
Ulu Kelantan	7	1	145	89	974	—	2	1,218	1,128	—	90	—	1,218	97.01	2.98
	14	1	348	247	10,786	—	76	11,472	11,130	—	342	—	11,472	97.01	2.98

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

Appendix X.

REPORT BY
DR. T. C. LONIE
HEALTH OFFICER.

A. SANITATION AND CONSERVANCY.

1. General Remarks.

The sanitary work in each district is carried out by the District Office who employs his own staff for the work.

Except in Kuala Krai, the subordinate staff are untrained.

In Kuala Krai, the Anti-malarial Inspector who is a trained and qualified Sanitary Inspector has been placed in charge of the sanitary work of the town, an arrangement which has been found to act very well. A similar arrangement is in contemplation for Kota Bharu and should result in the more satisfactory supervision of the sanitary work of the town.

2. Cleaning of Streets and Collection of Refuse.

This is done partly by convict labour and partly by Conservancy Board coolies. Refuse is collected from public refuse bins and burned on a convenient site in temporary incinerators. The system varies in efficiency in different areas, and in accordance with the size of the various towns. In none can it be said to be thoroughly satisfactory—the greatest need being for efficient permanent incinerators. Present arrangements provide for a permanent incinerator for Kuala Krai town only. Much remains to be done, and a considerable amount of money will require to be spent before refuse disposal arrangements in large areas in Kelantan can be considered satisfactory.

3. Collection and Disposal of Night Soil.

By insisting on bucket latrines wherever possible in connection with proposed new buildings, the number of these has considerably increased especially in Kota Bharu. In time also it is hoped to abolish the present insanitary floating latrines. While this to some extent prevents fouling of wells it also increases the importance and urgency of introducing a proper system of night soil disposal to replace the present insanitary practice of throwing such material in the river. This matter is now under consideration and a scheme for collection and disposal of night soil will be introduced early in 1929 in Kota Bharu and Tumpat. A system of trenching is now being carried out in Kuala Krai and a similar method of disposal will be made use of in Kota Bharu and Tumpat.

Small trenching grounds were laid out in Kota Bharu by the Health Department to deal with the night soil of the Hospital and of the Gaol. These have proved eminently satisfactory and in the New Hospital especially have much decreased the number of flies.

4. Water Supply.

These remain very unsatisfactory in every area. Shallow wells are in use and are in most cases highly polluted from surface washings and from the presence of pit latrines close at hand as is shown by the results of various chemical tests. The gradual replacement of pit latrines by those of the bucket type should eventually diminish the amount and degree of pollution of well water supplies.

5. Drains.

During the year excellent cement drains were constructed in Kuala Krai, which in this as in other directions, advanced considerably from a sanitary point of view.

Reports of the drainage needs of Kota Bharu and Tumpat showed that the work required in these places, and more especially in the former were both extensive and urgently necessary.

Earth drains in Kota Bharu are unsatisfactory as to construction, and used often as latrines and rubbish dumps, and have now apparently reached such a condition that their thorough cleaning would destroy their small remaining efficiency. Unfortunately present financial conditions do not allow of extensive schemes for improvement.

6. Housing.

An effort has been made to improve the standard of housing in controlled areas by scrutiny of plans to ensure that these are satisfactory from a sanitary point of view.

An effort has also been made to ensure that licensed premises are in satisfactory sanitary condition.

7. Anti-Malarial and Anti-Mosquito Work.

Malaria in Kelantan, according to figures of diagnosed cases admitted to Kota Bharu Hospital from all over the country during the year, shows a well marked wave of increased incidence in the months of June, July and August (See Appendix XI). This is in accordance with experience elsewhere, and in the opinion of authorities represents increased breeding of *Anopheles maculatus*, the dangerous carrier of malaria in Malaya. During the wet season hill streams and seepages are continually flushed by rain, in the hot season the channels are usually quite dry, but in the interval between the seasons pools of water and seepages often remain undisturbed for a sufficient period to allow for the production of a generation of adult mosquitoes. Therefore it is at this period that Anti-Malarial oiling is of the very greatest importance.

Fortunately, although stagnant water abounds, and Culicines and types of *Anopheles* other than *maculatus* breed prolifically in the flat country in the vicinity of Kota Bharu, extensive search has not revealed the presence of *Anopheles maculatus*, and to this fact may be ascribed the general freedom from malaria of the district. It is true that sporadic cases may and do occur as other *Anopheles* are capable to a slight extent of carrying the disease, but these cases are not of epidemiological importance. It is well to point out however, that even a slight change in the bionomics of the *Anopheles* species at present breeding so prolifically, or in the malaria parasite itself might well lead to a widespread epidemic of malaria. Such danger and also the fact that they carry other diseases such as Filariasis and dengue justify measures designed at least to reduce the number of mosquitoes.

For this reason oiling of breeding places is being carried on in Kota Bharu, and efforts have also been made to fill up depressions capable of holding water and to cut drains etc., where necessary. A great deal of this work has been carried out on the ground near the New Hospital with fair success.

In Kuala Krai a very large amount of Anti-Malarial Work has been done, streams having been cleared and canalised, and contour and other drains cut where necessary. Some of this work has been done in conjunction with the F. M. S. Railway Authorities, who also carry out a considerable amount of Anti-Malarial Work in connection with their headquarters camp here. Mosquito surveys have been used as a guide and all dangerous breeding places dealt with.

Regular Anti-Mosquito oiling also been carried out.

As a result of the action taken the incidence of malaria in Kuala Krai has fallen considerably.

It is hoped to do a certain amount of sub-soil drainage in Kuala Krai in 1929.

The cost of measures adopted in Kota Bharu and Kuala Krai is as follows:

Kota Bharu—Labour	...	...	...	\$1,465.90
Oil implements etc.	...	...	...	2,070.63
Total	...	...	...	\$3,536.53
Kuala Krai—Labour	...	...	...	\$850.87
Oil implements etc.	...	...	...	907.71
Total	...	...	...	1,758.58
				Grand total \$5,295.11

The work has been under the supervision of Mr. K. R. Menon, Anti-Malarial Inspector in Kota Bharu and Mr. C. D'Arango, Anti-Malarial Inspector in Kuala Krai, both of whom have rendered excellent service.

The Port of Tumpat fortunately enjoys a considerable freedom from Malaria, as is the case in other coast towns in this country, where there are no hills in the vicinity.

8. Legislation.

Shortly before the close of the year, there was passed the Municipal and Health Enactment which replaces the outgrown Conservancy Boards Enactment 1910.

New rules are in process of formulation which will enable this Enactment to be applied, and when these become Law, it is confidently anticipated that it will be possible to initiate a degree of sanitary control in prescribed areas which has not yet been found feasible.

B. HEALTH OF ESTATES.

1. General.

All Estates employing Indian labour are visited once per month by a Visiting Medical Practitioner who inspects Labour Force, visits Hospitals, gives instruction and Anti-Malarial Work.

Dr. W. J. Geale has carried out this work for many years, and it is impossible to speak too highly of his energy, keenness and ability in all matters relative to the health of Estates.

During the year the Estates were also visited and inspected at six monthly intervals by the Health Officer, who reported on conditions to the Controller of Labour and made such suggestions for improvement as were considered necessary.

2. Housing.

Good health depends to a considerable extent on good housing and it is therefore gratifying to note that during the year considerable progress was made in the carrying out of building programmes.

A certain amount of building still remains to be done, but almost all of this is normal replacement of worn out lines. On most Estates in Kelantan, housing conditions are now satisfactory.

3. Water Supply.

Extensive schemes for the supply of pure water to Coolie Lines etc., have been initiated and in many cases completed during the year. An excellent piece of engineering was carried through in the provision of a piped water supply to both Camps on Kuala Pathi Estate from a single source. A reservoir was made by damming up the opening of a valley containing several excellent springs, water is pumped from this reservoir to a storage tank built at a considerable elevation on a hill in the centre of the Estate whence it is run by gravity to taps in the lines and to the houses of the staff etc. The need for a new supply on this Estate was made evident when, in the early part of the year, dysentery, which was epidemic on the Estate and caused many deaths, ceased to give rise to any further anxiety when the former water supply plant was scrapped. Channing Estate had also installed a new supply by the end of the year and schemes on the Duff Development Company's, Estates were well advanced, that on Taku Estate being complete and working by December 1928.

4. General Sanitation.

Camps are as a rule kept very clean, all rubbish being generally disposed of either by burning or by burying.

Attention is being paid to the provision of satisfactory permanent latrines where present arrangements are not up to standard.

5. Hospitals.

Most Hospitals are now fairly satisfactory in general construction, those which are not mosquito proofed being provided with an adequate supply of mosquito nets. There is generally very adequate provision for diagnosis and treatment of cases of sickness occurring on the Estate, and only two Estates both convenient to Government Hospitals and of small size are without microscopes.

Dressers employed are of varying efficiency and an attempt has been made on the routine inspections, and by correspondence to improve the standard of their work. A scheme whereby, by courtesy of the Straits Settlements Medical Department Dressers could attend locally, a grading examination of the standard required in the Straits Settlements was arranged and the first examination will be held in January 1929. The new Rules under the Indian Immigration Enactment require in Kelantan a minimum standard of efficiency in dressers equivalent to that of Grade II Dressers Federated Malay States or Straits Settlements. but Estates find considerable difficulty in recruiting such men.

6. Anti-Malarial Work.

The contour drainage of dangerous seepages, canalising of drains, and oiling of all danger spots within half a mile from Lines and Hospitals were continued and improved. There is not yet however any permanent Anti-Malarial drainage on Estate. While the mortality from Malaria has been much decreased this year, it still accounts for 22.2% of all deaths on Estates, and the work at present being done must be further extended to render malaria of negligible importance. The magnitude of the Anti-Malarial Work may be gathered from the fact that Estates spend each year over \$50,000 on larvicidal oils for spraying of mosquito breeding places and control is exercised over more than 117 miles of drains besides large areas of swamp. Most Managers display a commendable keenness in the carrying out of Anti-Malarial measures on their Estates.

7. Labour Conditions.

There is still a considerable amount of labour unrest, particularly among Indians, on Estates. This manifests itself in constantly changing labour forces and an unwillingness on the part of labourers to co-operate in medical and sanitary arrangements made with a view to lessening the incidence of disease among them. This lack of co-operation is of course due largely to ignorance but there is reason to believe that trouble is often caused through the evil influence of certain members of the subordinate Indian Staffs who in devious ways acquire control over the rank and file of the Labour Force.

Unrest and shifting populations have an adverse effect on the health of Estate labour generally. Labourers wandering from place to place without sufficient nutriment, readily fall victims to disease which is often, quite unfairly, ascribed to the unhealthiness of the Estates from which they have absconded or been discharged.

Even on Estates, the Indian Labourer often economises unduly on the necessities of life, to his great detriment. This is in marked contrast to the practice among Malay, Javanese and Chinese labourers, who appear usually well fed and well provided with creature comforts including, generally, mosquito nets of some sort—things rarely seen in the Lines occupied by Indian Labour. This is not a matter of wages since often Javanese Labourers for instance, are paid at the same rates (sometimes less) than Indian Labourers.

8. Health and Vital Statistics.

In spite of the above draw-backs it is gratifying to be able to record a considerable improvement in the general health of Estates in 1928 and in the case of the three main causes of death the following figures show that each showed a decrease during 1928:

				Death rate per mille.	
				1928	1927
Malaria	...	...	...	9.58	15.86
Diarrhoea and Dysentery	...	...	...	6.70	9.86
Lung Diseases	...	...	...	9.03	10.78

The total mortality figures show a corresponding decrease. Out of an average total population of 7,089, 306 Deaths occurred—A mortality rate of 43.2. In 1927 corresponding figures were Population 6,494, Number of Deaths 390, Death Rate 60.1 per mille.

When the figures for Indian Population alone are considered it is noted that out of an average Indian Population of 5,102, 252 Deaths occurred—a Death Rate of 49.4. In 1927 when the average Indian Population was 4,306, 339 Deaths occurred—A Death Rate of 78.3. Among non-Indians, the mortality rate for 1928 was 27.2 thus emphasising the increased resistance of Malays, Javanese and Chinese to disease, and while this may be partly due to acclimatisation, I have already suggested that the higher standard of living common among these races is also a factor of importance.

There were 125 births on Estates during the year and 35 deaths under one year of age, a birth rate of 17.6 and an infantile mortality rate of 280. In 1927 the birth rate was 16.7 and the infantile mortality rate 342. Further statistics referring to the Health of Estates will be found in Appendices XII—XIV.

9. Collection of Statistics and Legislation.

During the latter half of the year the collection of Monthly Estate Health Statistics on the Schedule in use in the Federated Malay States was commenced, the former local Schedules being superseded.

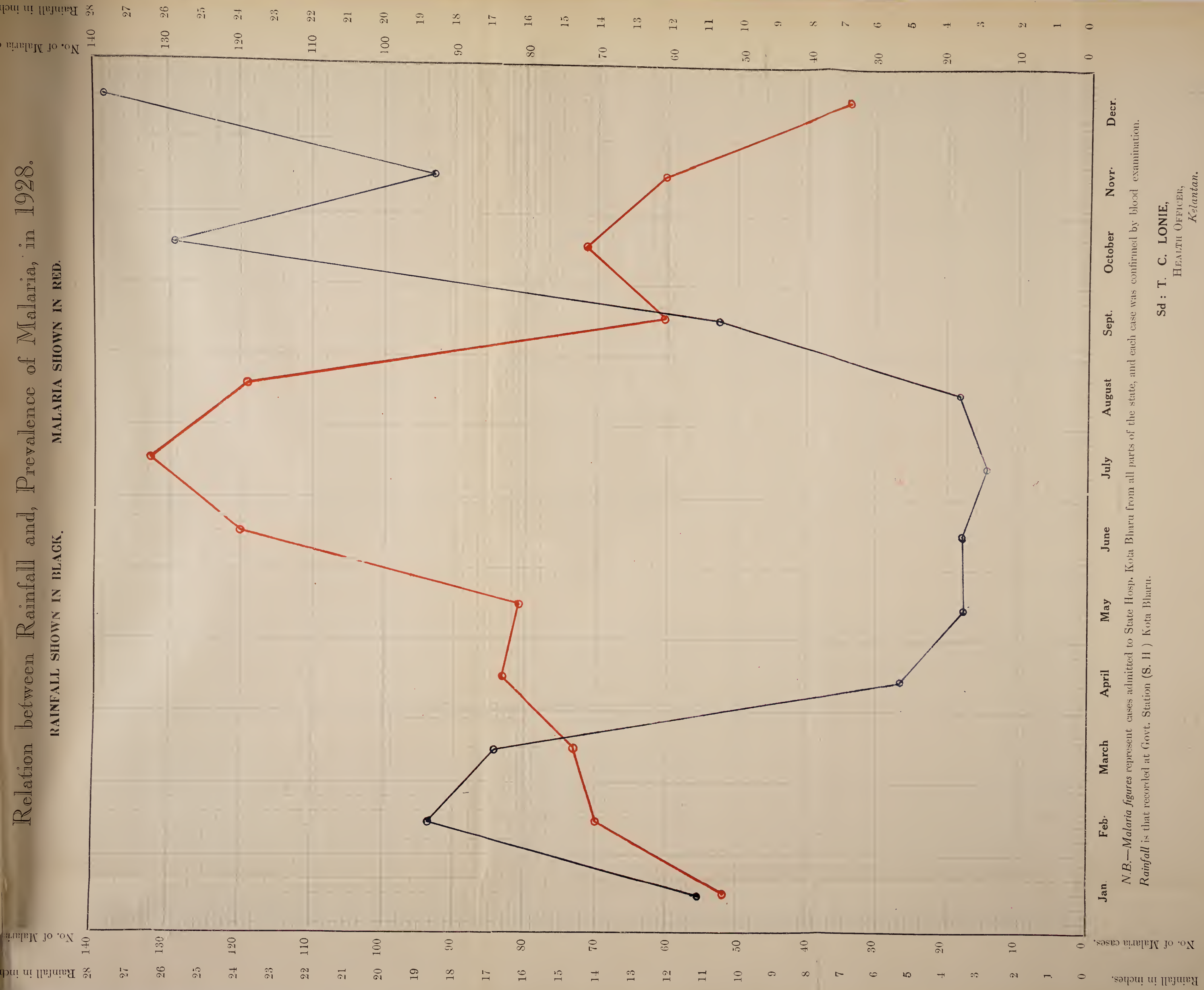
During the year also the “Rules under the Indian Immigration Enactment 1927” were passed. These set down various standards to which health work generally on Estates is required to conform and should be of considerable value.

Sd/- T. C. LONIE,

Health Officer,

KELANTAN.

Relation between Rainfall and, Prevalence of Malaria, in 1928.
 RAINFALL SHOWN IN BLACK. MALARIA SHOWN IN RED.



N.B.—Malaria figures represent cases admitted to State Hosp. Kota Bharu from all parts of the state, and each case was confirmed by blood examination.
 Rainfall is that recorded at Govt. Station (S. H) Kota Bharu.

Sd : T. C. LONIE,
 HEALTH OFFICER,
 Kelantan.

Appendix XII.

STATE OF KELANTAN.

Summary of Estate Vital Statistics for the year 1928.

Name of Estate.	Total Population.					Labourers.										1927.	
	Number.	Admissions.	Deaths.	Hospital admission rate.	Death-rate.	Population.			Hospital Admission.			Deaths.			Hospital Admission rate.	Death rate.	
						Indians.	Others.	Total.	Indians.	Others.	Total.	Indians.	Others.	Total.			
1. Kluat & Taku	203	439	14	1449	46.2	180	94	274	361	44	405	6	4	10	1035	61	
2. Kenneth ...	362	1250	14	4191	46.4	239	9	248	1098	...	1098	4	...	4	1583	59	
3. Lower Sokor	436	606	24	1390	55.0	297	5	302	542	...	542	8	...	8	140	51	
4. Kerilla ...	424	37	12	87	28.3	361	4	365	37	...	37	3	...	3	240	22	
5. Kuala Gris ...	225	275	13	1222	57.7	44	174	218	30	234	264	11	2	13	456	71	
6. Chaning & L. Kabu ...	486	1064	32	2189	65.8	346	119	465	877	187	1064	28	4	32	1892	74	
7. Pasir Jinggi ...	150	521	9	3473	60.0	144	...	144	520	...	520	9	...	9	4480	10	
8. Kuala Pahi ...	467	1008	49	2158	104.9	390	30	420	911	5	916	32	2	34	2284	6	
9. Kuala Hideng	60	112	3	1866	50.0	20	35	55	40	50	90	1	2	3	2074	64	
10. Kuala Pergau	134	302	14	2157	104.0	123	6	129	100	76	176	11	...	11	2105	111	
11. Balah ...	202	294	7	1470	34.6	140	29	169	266	17	283	5	1	6	1363	66	
12. Mengkebang..	339	265	9	746	26.5	120	150	270	140	153	293	3	4	7	511	21	
13. Kuala Nal ..	316	327	17	1025	53.8	212	95	307	180	90	270	11	3	14	1101	60	
14. Kuala Hau ...	236	420	5	1780	21.2	142	46	188	405	5	410	4	1	5	418	102	
15. Pasir Besar ...	222	274	5	1186	22.5	140	70	210	156	110	266	4	...	4	554	32	
16. St. Cyr ...	103	16	1	168	9.7	46	47	93	8	4	12	1	...	1	nil	nil	
17. Tebing Tinggi (Dominion R. Co. Ltd.)	488	281	2	562	4.1	406	49	455	180	60	240	1	...	1	1067	50	
18. Ulu Kesial ...	255	326	13	1300	50.9	195	40	235	260	30	290	9	2	11	1590	57	
19. Stapoh Nal and Kuala Geh ...	708	587	22	838	31.0	290	380	670	207	340	547	9	8	17	1415	66	
20. Pasir Gajah ...	244	356	10	1424	40.9	210	26	236	294	40	334	9	...	9	1648	69	
21. Kuala Pertang	654	907	31	1387	47.4	465	120	585	830	50	880	24	3	27	1372	70	
22. Sungei Bagan	206	14	...	70	...	2	194	196	..	13	13	..	...	...	37	8
23. Cherang Tuli	129	...	...	...	..	...	122	122	...	...	...	...	...	...	232	16
Grand Total ...	7089	9681	306	1364	43.2	4512	1744	6256	7442	1508	8950	193	36	229	1238	60	

Birth Rate and Infantile Mortality Rate.

	1928	1927
Total No. of Births ...	125	109
Total No. of Deaths under 1 year of age ...	35	89
Birth Rate ...	17.6	16.7
Infantile Mortality Rate ...	280	342

Sd/- T. C. LONIE,
Health Officer,
KELANTAN

APPENDIX XIII.

DEATH RATES OF INDIANS ON ESTATES.

Estates.		Population.	Deaths.	Death rate.
1.	Kluat and Taku	... 205	11	53.6
2.	Kenneth ...	... 294	15	51.0
3.	Lower Sokor ...	... 431	25	58.0
4.	Kerilla ...	... 511	8	16.1
5.	Chaning and Lepad Kabu ...	... 349	28	80.2
6.	Pasir Jingga ...	... 150	8	53.3
7.	Kuala Pahi ...	... 430	48	111.6
8.	Kuala Hidong ...	... 24	1	41.6
9.	Kuala Pergau ...	... 133	11	82.7
10.	Balah ...	... 152	5	32.8
11.	Mengkebang ...	... 127	3	23.6
12.	Kuala Nal ...	... 222	15	67.5
13.	Kuala Hau ...	... 171	4	23.4
14.	Pasir Besar ...	... 147	6	40.8
15.	St. Cyr ...	... 55	1	18.2
16.	Tebing Tinggi ...	... 429	1	2.3
17.	Ulu Kesial ...	... 207	12	57.9
18.	Stapoh Nal and Kuala Geh	298	12	40.2
19.	Pasir Gajah ...	... 221	10	45.2
20.	Kuala Pertang ...	... 543	28	51.5
21.	Sungei Bagan ...	... 2	—	—
Total ...		5,101	252	49.4

Sd/- T. C. LONIE,

Health Officer,

KELANTAN.

Appendix XIV.

SICKNESS ON ESTATES

Estate Hospitals.	Average monthly labour force including dependents.	Total admission.		Malaria.		Ankylos.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
D. D. C. L. Group:—							
Kluat and Taku ...	303	439	14	128	6	13	—
Kenneth ...	302	1250	14	569	5	24	1
Lower Sokor ...	436	606	24	362	3	34	—
Kerilla ...	424	37	12	15	2	8	—
Kuala Gris ...	225	275	13	126	5	38	—
Kelantan R. Estates Ltd., Channing and Lapan Kabu ...	486	1064	32	213	8	46	1
Pasir Jinggi ...	150	521	9	64	2	36	—
Kuala Pergau ...	134	302	14	90	6	28	—
Balah ...	292	294	7	85	2	16	—
Kuala Nal ...	316	327	17	78	2	24	—
Tebing Tinggi (Dominion R. Co.)	488	281	2	68	—	42	—
Sungei Bagan ...	206	14	—	6	—	—	—
Kuala Hau ...	226	420	5	126	1	96	—
Pasir Besar ..	222	274	5	63	1	36	—
Stapoh Nal and Kuala Geh ..	708	587	22	146	3	49	2
Mengkebang ..	339	263	9	73	3	14	—
Kuala Pertang ..	654	907	31	427	11	87	4
Pasir Gajah ...	244	356	10	87	2	38	1
Ulu Kesial ...	255	326	13	106	3	37	1
Kuala Pahi ...	467	1008	49	116	2	108	2
Kuala Hidong ...	60	112	3	34	1	39	—
St. Cyr ...	103	16	1	8	6	3	—
Cherang Tuli ...	129	—	—	—	—	—	—
Totals ...	7089	9681	306	2994	69	816	12

MISSIONS TO HOSPITAL.

Diarrhoea and Dysentery.		Venereal Diseases.		Ulcers.		Lung Diseases.		Sickness rate per mille.	Death rate per mille.
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
54	—	4	—	64	—	13	4	1449	46.2
23	1	26	—	80	—	46	3	4191	46.4
60	3	46	—	56	—	80	2	1390	55.0
9	2	—	—	6	—	4	2	87	28.3
15	—	26	—	46	—	39	4	1222	57.7
90	3	68	—	260	—	146	5	2189	65.8
90	1	26	—	146	—	76	3	3473	60.0
46	2	35	—	180	—	126	2	2151	104.0
38	1	26	—	64	—	38	2	1470	34.6
94	2	36	—	63	—	86	3	1025	53.8
27	—	17	—	58	—	47	1	562	4.1
—	—	—	—	—	—	8	—	70	—
76	1	68	—	64	—	87	2	1780	21.2
47	1	33	—	42	—	60	1	1186	22.5
94	3	41	—	166	—	186	5	828	31.0
24	1	18	—	27	—	54	3	746	26.5
248	12	69	—	57	—	198	6	1387	47.4
48	2	31	—	46	—	97	3	1424	40.9
80	3	34	—	64	—	86	4	1300	50.9
217	4	98	—	176	—	204	9	2158	104.9
28	—	14	—	—	—	12	—	1866	50
4	—	—	—	8	—	—	—	168	9.7
—	—	—	—	—	—	—	—	—	—
268	42	731	—	1609	—	1633	64	1364	43.2

Sd/- T. C. LONIE,
Health Officer,
KELANTAN.

APPENDIX XV.

MOST PREVALENT DISEASES TREATED IN F. M. S. R. (CONSTRUCTION)
HOSPITALS.

Hospitals.	In-Patients.						Out-Patients.					
	Total.	Deaths.	Death rates.	Malaria and Fever.	Dysentery and Diarrhoea.	Venereal Diseases.	Total.	Deaths.	Death rates.	Malaria and Fever.	Dysentery and Diarrhoea.	Venereal Diseases.
Kuala Gris	411	18	4.4%	232	25	12	1,560	7	0.45%	320	28	22
Manik Urai	218	7	3.7	128	16	13	882	—	—	249	29	29
Gua Musang	107	2	2.0	72	4	2	328	—	—	131	1	5
Dispensary:—												
Kuala Krai	—	—	—	—	—	—	1,410	2	0.14%	538	25	10
Kemubu	—	—	—	—	—	—	1,307	5	0.38%	445	73	7
Lipis	—	—	—	—	—	—	834	10	1.2%	255	22	8
Bertam	—	—	—	—	—	—	263	3	1.14%	224	20	18

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

APPENDIX XVI.

ANNUAL REPORT BY VETERINARY INSPECTOR FOR THE YEAR 1928.

1. I was appointed on 3.3.28.

2. On 27th November, a Police Constable was detailed to assist in veterinary work. He was taught to record symptoms and take blood films, and on 18th December, was sent to Kemuning where he was stationed till the end of the year.

3. The total number of animal diseases dealt with was as follows:—

Cattle	...	...	...	...	...	86
Pigs	...	...	...	...	...	8
Fowls	...	...	...	...	...	7
Cats	...	...	...	...	...	3
Dogs	...	...	...	...	...	2

In addition to above kampongs were visited and advice given where necessary.

4. **Anthrax.**—The first case was diagnosed on March 31st.

During the year 16 cases were diagnosed and confirmed by blood slides.

In addition there were 8 suspected cases (blood not available for examination).

The distribution of these cases was as follows:—

District.	Confirmed.	Suspected.
Ulu Kelantan	12	8
Pasir Puteh	1	—
Kota Bharu	3	—
	<hr/> 16	<hr/> 8

The Government Veterinary Surgeon, Singapore (Mr. G. Rocker) visited Kelantan on 4th May, in connection with this outbreak of Anthrax, and was satisfied, after examining blood and records of cases that there were cases of Anthrax.

It is difficult to enforce precautions, but all that is possible has been done by the District Officers concerned, and vaccine has been ordered, which will be used as soon as available.

5. **Foot and Mouth Diseases.**

There was one case in Pasir Puteh District.

6. **Fowl Cholera.**

There were two outbreaks of this disease. One at Pasir Mas (Kota Bharu District) in October, one on Kuala Geh Estate (Ulu Kelantan) in November.

All sick fowls were killed and all necessary precautions taken, and the outbreaks subsided.

7. **Export of Cattle and Buffaloes.**

228 head of cattle and 40 buffaloes were exported from Tumpat to Singapore for slaughter.

All were examined and certificates of health given.

Sd/- D. R. MEHTA,
Veterinary Inspector,
KELANTAN.

APPENDIX XVII.

ABSTRACT OF THERMOMETER AND RAINFALL OBSERVATIONS AT STATIONS
OF THE STATE DURING THE YEAR 1928.

K O T A B H A R U.					K U A L A K E L A N T A N.			
Thermometer.					Thermometer.			
Mean.					Mean.			
Months.	Maximum.	Minimum.	Range.	Total rainfall during the month.	Maximum.	Minimum.	Range.	Total rainfall during the month.
January	84.29	75.67	8.62	10.95	84.68	68.58	16.09	6.38
February	85.00	75.51	9.48	18.59	84.38	68.79	15.59	11.94
March	87.38	75.48	11.90	16.66	85.58	68.70	16.87	16.43
April	86.96	77.1	9.8	5.26	87.2	69.8	17.4	6.54
May	91.80	76.12	15.67	3.57	88.77	71.67	17.09	2.70
June	93.96	75.26	18.70	3.57	87.60	71.26	16.40	1.61
July	94.74	74.96	19.77	3.06	88.87	73.32	15.55	2.31
August	94.25	72.83	21.41	3.67	88.09	70.12	17.96	6.26
September	94.46	74.13	20.33	10.60	89.93	71.50	18.43	3.22
October	95.19	73.83	21.35	25.76	85.64	68.97	16.67	26.31
November	91.40	73.96	17.43	18.61	83.73	68.87	14.86	24.65
December	89.83	73.61	16.22	27.64	81.84	68.42	13.22	29.39
Total Rainfall	...	...	147.94				137.74	
Average monthly Rainfall	...	...	12.32				11.47	
Mean Temperature	...	...	82.84				78.18	

C H A N I N G.					K U A L A H I D O N G.	P A S I R P U T E H.	K U A L A K R A I.	K U A L A P E R T A N G.
Thermometer.								
Mean.								
Months.	Maximum.	Minimum.	Range.	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.
January	85.90	68.52	17.38	6.84	5.31	9.71	5.69	12.75
February	86.38	71.31	15.07	22.05	22.50	24.89	19.83	20.96
March	90.26	71.52	18.74	11.31	11.16	19.19	12.34	15.04
April	92.13	72.66	19.47	5.93	6.71	7.96	4.91	7.13
May	93.03	73.06	19.97	6.84	4.16	9.69	6.79	12.23
June	91.50	72.93	18.57	4.16	3.95	2.70	3.41	5.00
July	88.29	70.22	18.07	2.93	4.05	3.97	3.23	3.79
August	78.26	72.12	6.14	5.69	8.72	7.33	7.74	13.45
September	91.60	71.44	22.16	5.95	8.45	14.91	10.63	10.89
October	89.25	71.03	18.22	10.41	17.65	19.68	14.53	11.81
November	87.50	71.13	16.37	10.56	10.94	17.28	11.67	15.88
December	83.61	69.84	13.77	50.70	—	38.13	46.57	51.60
Total Rainfall	...	...	143.37		103.60	175.44	147.34	180.53
Average monthly Rainfall	...	...	11.94		8.63	14.62	12.27	15.04
Mean Temperature	...	...	75.92					

Appendix XVII —(Continued.)

Months.	ULU KESIAL.	CHERANG TULI.	BALAH ESTATE.	KUALA PERGAU.	KERILJA ESTATE.	KENNETH ESTATE.	SUNGEI BAGAN.
	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.	Total rainfall during the month.
January	8.96	12.48	9.23	8.71	11.27	6.71	9.89
February	15.95	27.84	19.66	26.57	21.86	22.51	22.35
March	18.74	20.72	9.45	11.43	12.60	14.94	20.89
April	6.44	14.11	5.77	7.69	6.99	6.67	12.56
May	10.08	13.10	7.75	11.48	11.86	12.38	11.86
June	6.14	4.74	7.16	4.91	2.94	2.45	10.48
July	2.53	2.69	5.08	7.91	3.44	5.22	3.79
August	13.37	10.43	4.54	6.94	9.89	12.64	9.64
September	12.64	11.43	5.98	7.95	8.70	5.49	12.31
October	22.17	10.74	22.08	17.89	15.58	13.88	22.53
November	12.21	19.38	16.62	17.12	11.29	15.43	26.07
December	53.89	42.62	45.69	46.12	42.72	51.19	62.45
Total Rainfall	183.12	190.28	159.01	174.72	159.14	169.51	224.82
Average monthly Rainfall	15.26	15.85	13.25	14.56	13.26	14.12	18.73

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

APPENDIX XVIII.

ABSTRACT OF METEOROLOGICAL READINGS IN THE STATE OF KELANTAN
FROM 1904 TO 1928.

Year.	KOTA BHARU.				KUALA LEBIR.			
	Temperature.		Rainfall.		Temperature.		Rainfall.	
	Highest.	Lowest.	Total.	Greatest in 24 hours.	Highest.	Lowest.	Total.	Greatest in 24 hours.
1904	—	—	—	—	94.0	62.0	100.36	5.46
1905	90.0	67.0	97.44	7.27	96.0	63.0	89.78	5.10
1906	92.0	72.0	107.44	3.80	94.5	67.0	136.96	7.88
1907	93.7	68.0	108.37	7.31	94.0	62.0	120.54	7.86
1908	90.7	71.0	109.13	7.74	95.0	69.0	95.16	5.36
1909	91.7	69.0	90.09	4.58	95.0	67.5	73.09	3.71
1910	92.5	68.5	123.40	4.49	93.5	68.0	115.78	5.35
1911	91.5	66.5	165.86	11.05	97.2	64.0	105.84	4.59
1912	91.5	67.5	108.60	4.01	95.8	67.0	98.78	5.97
1913	95.0	68.0	112.85	5.20	96.0	62.0	112.13	9.84
1914	96.0	68.0	100.00	6.95	98.0	66.0	74.69	3.87
1915	96.0	67.0	95.80	4.96	96.6	66.5	97.52	5.99
1916	95.0	63.0	151.52	13.43	96.3	64.5	112.46	8.00
1917	97.0	67.0	165.62	13.24	95.4	67.4	102.56	8.43
1918	95.0	63.0	132.23	6.03	96.5	65.2	89.89	3.98
1919	97.0	68.0	125.74	7.98	97.2	67.0	103.23	3.93
1920	96.0	66.0	128.51	12.23	95.0	67.5	97.04	7.24
1921	96.0	69.0	126.99	9.80	96.8	69.0	135.12	8.15
1922	95.0	68.0	194.25	15.52	94.0	67.0	72.25	5.62
1923	95.0	67.0	108.23	4.97	—	—	—	—
1924	95.0	69.0	106.98	12.80	—	—	—	—
1925	98.0	66.0	116.96	4.40	—	—	—	—
1926	99.0	67.0	128.09	6.55	—	—	—	—
1927	92.0	70.0	101.90	5.62	—	—	—	—
1928	99.0	69.0	147.94	10.73	—	—	—	—

Appendix XVIII.—(Continued.)

Year.	KUALA KELANTAN.				KUALA NAL.			
	Temperature.		Rainfall.		Temperature.		Rainfall.	
	Highest.	Lowest.	Total.	Greatest in 24 hours.	Highest.	Lowest.	Total.	Greatest in 24 hours.
1904	—	—	—	—	—	—	—	—
1905	91.0	68.0	94.08	11.44	—	—	—	—
1906	—	—	—	—	—	—	—	—
1907	—	—	—	—	—	—	—	—
1908	89.0	70.0	106.40	9.42	—	—	—	—
1909	92.0	70.0	89.56	5.51	—	—	—	—
1910	90.0	70.0	100.46	4.75	—	—	—	—
1911	91.0	71.0	152.83	11.59	95.0	66.0	107.95	6.12
1912	—	—	111.71	7.30	92.0	69.0	103.13	6.12
1913	—	—	110.28	3.90	94.0	69.0	106.99	10.00
1914	93.0	70.0	89.13	6.02	100.0	68.0	86.66	3.30
1915	91.0	72.0	90.77	5.08	98.0	64.0	99.04	4.50
1916	91.0	71.0	131.98	11.15	97.0	64.0	115.66	9.85
1917	91.0	72.0	143.39	11.35	98.0	66.0	98.09	10.40
1918	89.0	69.0	121.03	7.35	89.0	62.0	102.27	4.97
1919	91.0	69.0	93.73	6.32	91.0	65.0	104.56	4.65
1920	90.0	72.0	104.04	8.50	87.0	63.0	92.64	9.30
1921	89.	72.0	129.70	7.75	87.0	66.0	139.61	8.34
1922	90.0	72.0	172.24	14.10	87.0	67.0	157.71	9.65
1923	90.0	70.0	104.18	18.33	87.0	62.0	132.01	7.67
1924	92.0	71.0	92.21	10.49	87.0	65.0	105.31	9.17
1925	93.0	61.0	95.81	4.50	86.0	65.0	98.43	3.60
1926	93.0	62.0	111.08	7.40	86.0	64.0	138.40	9.45
1927	90.0	62.0	96.86	4.80	84.0	64.0	107.76	3.78
1928	93.0	63.0	137.74	10.80	—	—	—	—

Appendix XVIII.—(Continued)

Year.	PAHI PLANTATIONS.				CHANING.			
	Temperature.		Rainfall.		Temperature.		Rainfall.	
	Highest.	Lowest.	Total.	Greatest in 24 hours.	Highest.	Lowest.	Total.	Greatest in 24 hours.
1904	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—
1907	—	—	—	—	—	—	—	—
1908	—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—	—	—
1910	—	—	107.45	4.40	—	—	—	—
1911	93.0	64.0	97.80	3.55	—	—	106.09	3.83
1912	93.0	66.0	91.77	7.00	—	—	96.16	7.00
1913	90.0	71.0	101.54	9.35	—	—	104.85	9.35
1914	94.0	65.0	64.72	4.58	97.0	66.0	65.10	4.76
1915	97.0	68.0	79.68	5.00	98.5	68.0	95.05	5.24
1916	97.0	62.0	110.61	8.10	96.0	64.0	113.88	8.10
1917	96.0	68.0	98.13	8.69	96.0	63.0	95.98	7.59
1918	98.0	61.0	93.64	3.50	97.0	63.0	88.60	2.94
1919	101.0	66.0	96.30	4.09	98.0	66.0	96.97	3.80
1920	98.0	66.0	99.66	6.55	96.0	67.0	82.16	4.02
1921	99.0	67.0	126.49	8.50	96.5	68.0	111.38	8.01
1922	92.0	69.0	122.97	5.10	95.5	67.0	113.77	5.09
1923	92.0	64.0	95.64	5.27	98.0	64.0	89.32	5.42
1924	91.0	69.0	106.80	8.07	98.0	66.0	94.43	7.00
1925	90.0	61.0	87.39	3.72	97.0	66.0	93.52	3.88
1926	90.0	70.0	74.67	5.38	101.0	61.0	83.53	5.89
1927	—	—	79.66	3.30	96.0	64.0	82.91	4.58
1928	—	—	—	—	95.0	66.0	143.37	10.67

Appendix XVIII.—(Continued.)

Year.	TAKU ESTATE.				PASIR BESAR.			
	Temperature.		Rainfall.		Temperature.		Rainfall.	
	Highest.	Lowest.	Total.	Greatest in 24 hours.	Highest.	Lowest.	Total.	Greatest in 24 hours.
1904	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—
1907	—	—	85.11	6.28	—	—	—	—
1908	—	—	96.12	5.56	—	—	—	—
1909	—	—	73.63	3.36	—	—	51.40	3.25
1910	—	—	114.14	3.91	—	—	137.76	5.84
1911	—	—	115.67	4.10	—	—	122.57	6.80
1912	—	—	99.82	6.60	—	—	68.84	5.80
1913	—	—	111.32	9.22	—	—	119.74	9.40
1914	—	—	72.21	—	—	—	45.93	3.90
1915	—	—	69.89	3.34	—	—	125.16	5.19
1916	—	—	—	—	—	—	116.86	9.52
1917	—	—	111.10	9.60	—	—	135.38	16.04
1918	—	—	106.50	6.00	—	—	115.29	5.45
1919	—	—	115.70	5.30	—	—	129.13	6.00
1920	—	—	95.00	4.03	—	—	111.23	7.23
1921	—	—	129.21	8.45	—	—	137.29	6.90
1922	93.0	71.0	145.52	8.76	—	—	150.37	5.80
1923	96.0	66.0	137.48	7.15	99.0	66.0	95.92	8.70
1924	97.0	68.0	107.95	10.20	102.0	72.0	93.91	7.82
1925	96.0	68.0	114.91	5.71	—	—	122.13	4.10
1926	100.0	68.0	96.53	6.17	—	—	93.69	8.20
1927	97.0	68.0	113.23	5.17	—	—	132.37	4.20
1928	—	—	—	—	—	—	—	—

Appendix XVIII.—(Continued.)

Year.	PASIR JINGGI.		KENNETH ESTATE.		ULU KESIAL.		PASIR PUTEH.	
	Rainfall.		Rainfall.		Rainfall.		Rainfall.	
	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.
1904	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—
1907	—	—	—	—	—	—	—	—
1908	—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—	—	—
1910	—	—	—	—	—	—	—	—
1911	102.10	3.76	131.96	6.51	—	—	—	—
1912	90.92	6.72	113.78	9.82	—	—	—	—
1913	108.72	10.60	118.08	10.28	—	—	—	—
1914	64.13	2.47	79.15	3.76	—	—	94.81	6.97
1915	63.19	3.54	90.33	5.51	—	—	—	—
1916	110.13	6.55	—	—	151.60	—	140.95	9.50
1917	100.41	7.00	99.97	11.32	142.48	15.14	115.15	11.10
1918	83.62	3.27	107.88	6.71	131.87	4.83	102.79	2.20
1919	96.30	5.45	104.50	4.59	139.15	5.80	135.57	7.23
1920	76.71	2.31	101.16	7.40	93.35	3.70	125.38	15.63
1921	123.40	8.01	123.32	3.06	152.92	8.80	159.89	11.19
1922	133.58	6.25	144.60	8.92	148.05	9.50	223.08	20.97
1923	95.84	5.16	128.87	6.50	156.11	7.36	123.50	8.58
1924	103.24	7.40	120.13	10.75	113.92	10.20	124.63	12.65
1925	95.35	4.60	112.29	5.20	154.42	6.82	128.26	5.56
1926	93.85	4.20	108.89	4.42	199.71	10.44	169.40	10.50
1927	71.36	4.10	76.93	3.37	159.96	5.02	144.17	6.60
1928	—	—	169.51	9.64	183.12	9.35	103.60	10.27

Appendix XVIII—(Continued.)

Year.	KUALA KRAI.		KUALA GEH.		PASIR GAJAH.		KUALA PERTAN.	
	Rainfall.		Rainfall.		Rainfall.		Rainfall.	
	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.
1904	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—
1907	—	—	—	—	—	—	—	—
1908	—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—	—	—
1910	—	—	—	—	—	—	—	—
1911	—	—	—	—	93.60	6.54	—	—
1912	—	—	—	—	98.86	6.90	—	—
1913	—	—	—	—	124.16	11.50	—	—
1914	49.72	2.16	—	—	74.64	4.10	—	—
1915	85.97	4.00	—	—	109.26	5.90	—	—
1916	111.36	9.65	—	—	123.64	—	—	—
1917	98.65	7.15	133.13	11.20	106.70	7.02	107.12	7.86
1918	94.73	4.38	125.93	7.00	109.89	6.26	113.12	5.55
1919	98.58	4.14	120.03	5.60	126.22	6.26	121.11	6.23
1920	93.58	6.57	91.28	8.36	108.71	7.16	94.47	3.87
1921	136.95	8.36	138.55	9.08	151.49	8.91	129.61	8.43
1922	143.97	7.10	152.64	11.59	182.19	12.10	139.14	8.00
1923	129.35	6.90	135.18	9.40	152.08	11.05	123.97	6.54
1924	105.37	10.78	107.34	9.56	126.97	12.57	105.67	10.85
1925	102.66	5.50	125.13	5.40	145.94	5.45	115.61	4.77
1926	135.93	7.95	176.09	7.92	199.97	14.06	84.60	4.15
1927	105.30	4.26	131.57	4.18	150.60	5.50	128.67	5.40
1928	147.34	10.15	—	—	—	—	180.53	9.04

Appendix XVIII.—(Continued.)

Year.	KERILLA ESTATE.		DOMINION R. CO.		LOWER SOKOR.		KUALA PERGAU.	
	Rainfall.		Rainfall.		Rainfall.		Rainfall.	
	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 Total.
1904	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—
1907	—	—	—	—	—	—	—	—
1908	—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—	—	—
1910	—	—	—	—	—	—	—	—
1911	—	—	—	—	—	—	—	—
1912	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—
1914	—	—	104.53	4.00	—	—	—	—
1915	—	—	125.01	6.40	—	—	—	—
1916	—	—	141.46	10.55	130.37	10.32	—	—
1917	118.78	9.82	142.92	17.75	120.36	10.80	109.03	6.21
1918	133.66	5.28	123.71	5.90	112.61	7.06	101.11	2.78
1919	153.01	9.55	145.86	6.95	123.27	7.10	85.21	1.81
1920	104.94	8.40	119.85	9.13	108.60	7.20	81.40	1.59
1921	141.92	6.66	154.61	8.96	144.73	7.30	93.45	2.42
1922	166.21	10.85	161.62	11.15	169.61	11.32	112.48	5.96
1923	127.25	8.95	142.64	11.00	106.01	2.66	104.26	4.28
1924	110.25	9.45	127.53	11.14	82.20	9.30	117.09	6.88
1925	122.63	5.80	132.22	6.58	97.60	5.50	104.06	4.52
1926	107.50	8.30	161.16	9.64	100.83	8.80	79.72	6.90
1927	124.42	4.74	128.85	4.33	86.51	3.40	83.61	3.30
1928	159.14	7.05	—	—	—	—	174.72	8.26

Appendix XVIII.—(Continued.)

Year	BALAH ESTATE.		BAGAN RIVER R. CO.		SUNGEI BAGAN R. CO.		STAPOH NAL R.	
	Rainfall.		Rainfall.		Rainfall.		Rainfall.	
	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.
1904	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—
1907	—	—	—	—	—	—	—	—
1908	—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—	—	—
1910	—	—	—	—	—	—	—	—
1911	—	—	—	—	—	—	—	—
1912	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—
1914	—	—	—	—	—	—	—	—
1915	—	—	—	—	—	—	—	—
1916	—	—	—	—	—	—	—	—
1917	129.27	7.39	—	—	—	—	—	—
1918	114.80	—	—	—	—	—	—	—
1919	127.51	3.36	—	—	—	—	—	—
1920	93.12	5.80	—	—	—	—	—	—
1921	157.41	5.48	146.24	8.34	152.03	9.00	126.77	7.95
1922	152.71	7.11	173.67	5.70	205.96	8.35	137.04	11.65
1923	113.72	5.50	146.40	7.89	155.25	8.03	128.21	5.05
1924	129.41	9.18	131.33	10.50	145.68	8.60	111.40	11.12
1925	133.94	5.35	138.27	5.95	137.80	6.22	—	—
1926	104.08	7.00	143.34	8.95	195.31	10.20	—	—
1927	105.84	3.31	—	—	174.22	5.90	—	—
1928	159.01	6.97	—	—	224.82	10.90	—	—

Appendix XVIII.—(Continued.)

Year.					CHERANG TULI.		KUALA SEMERAK.	
					Rainfall.		Rainfall.	
					Total.	Greatest in 24 hours.	Total.	Greatest in 24 hours.
1904	...	...	...	...	—	—	—	—
1905	...	...	...	...	—	—	—	—
1906	...	...	...	...	—	—	—	—
1907	...	...	...	...	—	—	—	—
1908	...	...	...	...	—	—	—	—
1909	...	...	...	...	—	—	—	—
1910	...	...	...	...	—	—	—	—
1911	...	...	...	...	—	—	—	—
1912	...	...	...	...	—	—	—	—
1913	...	...	...	...	—	—	—	—
1914	...	...	...	...	—	—	—	—
1915								
1916								
1917	...	...	...	...	—	—	—	—
1918	...	...	...	...	—	—	—	—
1919	...	...	...	...	—	—	—	—
1920	...	...	...	...	—	—	—	—
1921	...	...	...	...	—	—	—	—
1922	...	...	...	...	—	—	—	—
1923	...	...	...	...	—	—	—	—
1924	...	...	...	...	131.79	12.24	—	—
1925	...	...	...	...	129.54	5.01	112.84	5.20
1926	...	...	...	...	204.63	9.73	131.23	8.47
1927	...	...	...	...	149.66	5.70	—	—
1928	...	...	...	...	190.28	11.60	—	—

Sd/- L. W. EVANS,

Ag. Chief Medical Officer,

KELANTAN.

